IRON & MANGANESE REMOVAL FILTER

INSTALLATION & OPERATING INSTRUCTIONS

Model : **AFIM20-180**

Serial No : ……

Manufacturer and Supplier of

FILTRATION & WATER TREATMENT PRODUCTS
for commercial, industrial and residential application

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OPERATING PRINCIPLE
CONTINUOUS REGENERATION

General

Our AF Series Filters are fully automatic incorporating Backwash, Rinse-Pause, Fast Rinse and Service Cycles, controlled by cam switches in the timer. Frequency of Backwashing can be altered from that suggested in the commissioning section, if conditions dictate alterations.

Water enters the unit through the multi-port valve and passes through the media, underdrain gravel and the distributor leaving through the multi-port valve.

Iron, Manganese and Hydrogen sulphide are removed using media through oxidation and filtration. Regeneration is required with Potassium Permanganate,

The oxidised precipitate is filtered out in the top layer of filter coal and the bottom layer of manganese greensand media mainly acts as a barrier to remove any unprecipitated iron/manganese.

The regeneration is automatically drawn from the regenerate tank and passed through the media, thus effecting regeneration.

This unit is not designed to remove colloidal iron matter, a plant capable of coagulation is required in such cases.

Operating Parameters

Water Temperature	5ºC - 50ºC
Water pH	6.8 - 8.8
Water Pressure	205 - 690 kPa
Oil	Free of Hydrocarbons
Maximum practical iron limit	15 mg/l of iron and manganese
Maximum practical limit hydrogen sulphide	5 mg/l

Minimum of 4 mg/l alkalinity for each mg/l of iron or iron manganese present

NOTE: If Filter will be in an area accessible to small children and pets, it is strongly recommended that the Potassium tank be placed out of reach to avoid accidents. The following label is attached to every Potassium Permanganate container.
Please take note of caution label.

This unit is not designed to remove colloidal iron matter, a plant capable of coagulation is required in such cases.

AF SERIES FILTERS

Table 2

TYPE	MODEL	CONTINUOS FLOW RATE L.P.M	* PEAK FLOW RATE L.P.M	BACKWASH FLOW RATE L.P.M	VALVE	APPROX. WEIGHT KG	OPERATING PROCEDURES
Manganese & Greensand	AFIM20	39	62	82	180	300	Water Temp: 5°C - 50°C Water pH: 6.8 - 8.8 Suspended Solids Max 50 mg/l (Refer factory) Iron & Manganese: Max 15 mg/l Oil: Free of hydrocarbons Alkalinity: 4 mg/l for each 1 mg/l of iron and or manganese. **Note:** Due to the complexities of iron, manganese and hydrogen sulphide it is recommended that product selection be referred to IBC Water

Valve	180
Inlet (mm)	40
Outlet (mm)	40
Drain (mm)	40

Operating Pressure: 205 - 690 kPa
Temperature: 5°C - 50°C Electrical: 240V 50Hz 3 watts maximum

Warning: A pressure reduction valve should be installed if water hammer prevails.

Table at left shows recommended MINIMUM plumbing sizes.
FAILURE TO OBSERVE WARNING WILL VOID WARRANTY

* The above flow rates are only suitable for an Iron/Manganese total content of 1 mg/l. Refer to the factory for suitability of flow rates at a higher total metal content

INSTALLATION

Check the equipment upon arrival for damage or shortages and report same to our Office or Agent before commencing installation.

Locate the unit on a clean, firm, level foundation, preferably concrete, with sufficient space for operation and maintenance. Level with shims if necessary. Position the tank in the correct position before loading the Media. Make due allowances for space for maintenance purposes.

1. Make sure the filter tank is empty and clean.

2. Install the distributor pipe in the filter tank, check the height in relation to top of filter tank. The pipe must be level or 3mm below the top of the tank. The distributor consists of a length of pipe with a bottom strainer and top disc.

3. Place a clean rag or a plastic bag over the end of the distributor pipe - no gravel or media must enter distributor pipe.

4. Pour in the underbed gravel.

5. Level out the underbed gravel - 40kg No. 6 Gravel

6. After loading and levelling the gravel underbed, add the bags of manganese greensand and level. Then fill the tank with water to approximately 300mm from the tank top.

7. Clean top of neck and threads of all traces of media. Remove the plastic cap fitted in Step 3 taking care not to raise the distributor pipe.

8. Unpack the valve, remove the cap screws and separate the adaptor. Store gasket safely. Check that the tank seal is in place (Fig. 1). Remove the rubber sleeve and using a little 'O' ring lubricant, lubricate the inside surface only. Place rubber sleeve into tank adaptor (Fig. 1).

9. Fit the adaptor to the tank, carefully, to allow the distributor pipe to enter the rubber sleeve and locate centrally. Screw down firmly by hand. Do not over tighten. Place the gasket on tank adaptor, fit the valve body with the cap screws provided (Fig. 1). Tighten cap screws evenly.

10. Plumb the unit, referring to figures 4 & 5 for pipework installation to suit the specific unit, noting the following:
    a) Use only pipe sizes recommended for this unit in the performance data Table 1 inside front cover of these instructions.
    b) Fit pipe unions or flanges to inlet, outlet and drain lines for ease of access for maintenance or cleaning.
    c) Install inlet and outlet isolating valves and *A Manual Bypass Valve* - (Refer Fig. 4 Item C).

d) Connect pipework and valves MUST be support to prevent loading on the valve and filter. Before connecting pipework, flush or lines, close inlet, outlet and bypass valves.
e) The drain line must discharge into open drain or pipe, with a maximum of 100mm diameter and an air gap to conform to sanitary codes and permit observation, not more than 7.6 metres from the unit.
f) Power supply is required not more than 1.5 metres from the unit and should be a 3 pin 10A 240V 50Hz G.P.O preferably earth leakage protected. Total power draw is 13 watts maximum.
g) Fit external backwash flow controller using cap screws provided (Fig. 1).
h) Maximum operation pressure 450 kPa (65 p.s.i). Maximum operating pressure 690 kPa valve, this must be a non fluctuating supply.

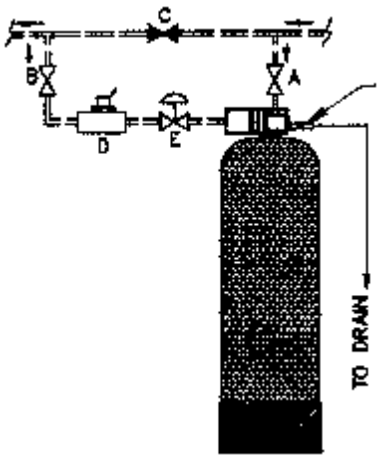
The control system is sometimes shipped as a sub-assembly to avoid damage in transit. The water filter should be assembled, piped and wired according to the following recommendations. The following instructions are provided as a general guide. The filter requires a 10amp 240 volt GPO. The filter installation must be protected from the elements

FIG.4 - INSTALLATION -- SINGLE TANK BIRM IRON REMOVAL FILTER INSTALLATION

* Pipework Layout - suggestive only
* Unit only supplied
* Pipe, Valves, Solenoids, Water Meter supplied by others

All pipework connections to be flanged or barrel union, for ease of removal and maintenance.

* USE PIPEWORK SIZES SHOWN IN PERFORMANCE DATA TABLE 2

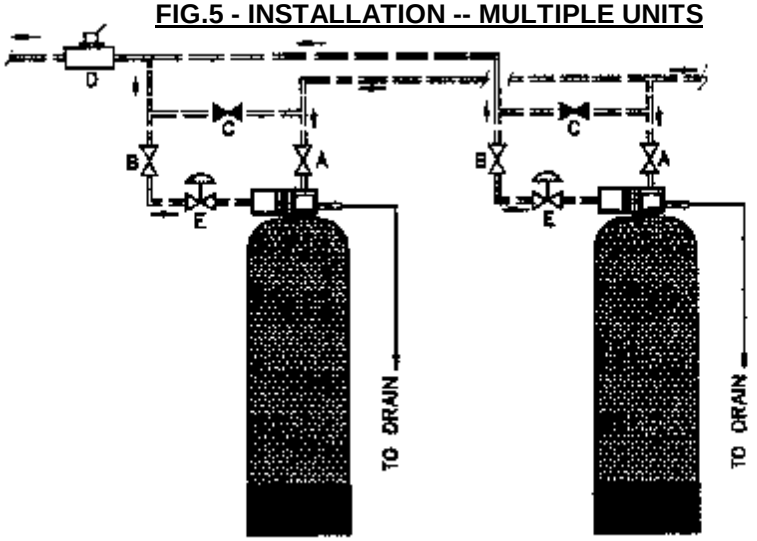


External Backwash

Flow Controller supplied separate must be fitted before Connecting Drain Line

A = Inlet Isolating Valve -- Manual
B = Outlet Isolating Valve -- Manual
C = Bypass Valve -- Manual - optional
D = Water Meter - optional, fit only where metering of supply is required
E = Solenoid Valve - optional, fit only where raw water to service is not required during REGENERATION. Valve must be 240V. 50Hz operation normally open and equal to pipeline size - connect to terminals 2 and 5 inside valve cover (Refer Fig.17)

FIG.5 - INSTALLATION -- MULTIPLE UNITS



AFIM20-180 MANGANESE GREENSAND FILTER

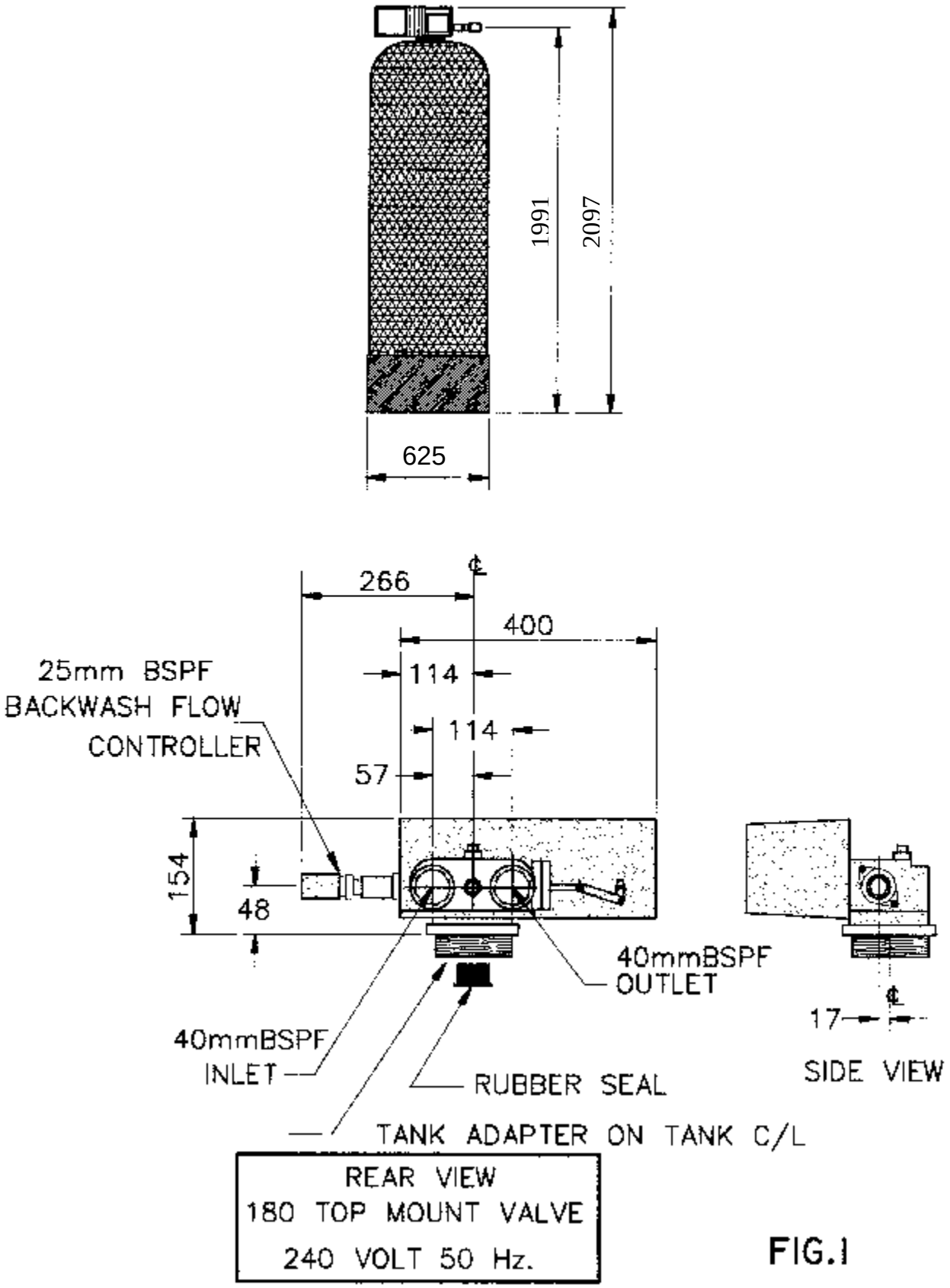


FIG.1

MEDIA PLACEMENT

MANGANESE FILTER

Table 1

Sequence in Tank	AFIM20
1st (in bottom of tank)	**40kg #6 gravel** (2 x 20kg)
2nd	***200kg Manganese Greensand** (5 x 40kg)

INSTALLATION OF POTASSIUM PERMANGANATE TANK

1. Pour 2kg of Potassium Permanganate into the tank. A further 1kg container of Potassium Permanganate should be added when the colour of the solution in the Potassium Permanganate tank lightens in colour. If your hands or arms are stained, the stain can be removed by washing with a softener mineral cleaner containing sodium hydrosulphide. 1kg Potassium Permanganate is sufficient for two (2) regenerations.

2. Place the Potassium Permanganate tank as near as possible to the mineral tank.

   a) If filter will be in an area accessible to the general public and/or animals, it is strongly recommended that this Potassium Permanganate Tank be placed out of their reach to avoid accidents.

   b) The backwash waste water from the unit should not be pumped to an open drain or any area accessible to the general public and/or animals.

POISON

NOT TO BE TAKEN
KEEP OUT OF REACH OF CHILDREN

POTASSIUM PERMANGANATE

UN. No.
1490

3. If external by-pass valve is used, be certain it is left in the **SERVICE** position after installation is completed.

4. The timer may be set for a regeneration frequency of from once in seven (7) days to once each day. Determine a regeneration schedule and adjust the timer. To calculate regeneration frequency it is assumed each person used 0.25 kl/day and the capacity of the unit is:

   For Iron Removal only = 91.0 grams

   For Iron and Manganese Removal = 53.0 grams

The following are examples of how to calculate regeneration periods:

Number of people	=	P
Iron content	=	A mg/L as Fe
Manganese	=	B mg/L as Mn
Number of regenerations per 7 days	=	$\frac{P \times 0.25 \times A \times 7}{91}$
N (for Iron & Manganese removal)	=	$\frac{P \times 0.25 \times (A+B) \times 7}{53}$

Always increase N to the next highest whole number.

Example:

Let P = 4 people A = 10mg/L Fe (iron) B = 0.2mg/L Mn (manganese)

Then $N = \frac{4 \times 0.25 \times 10.2 \times 7}{53} = 1.35 = 2$ Then

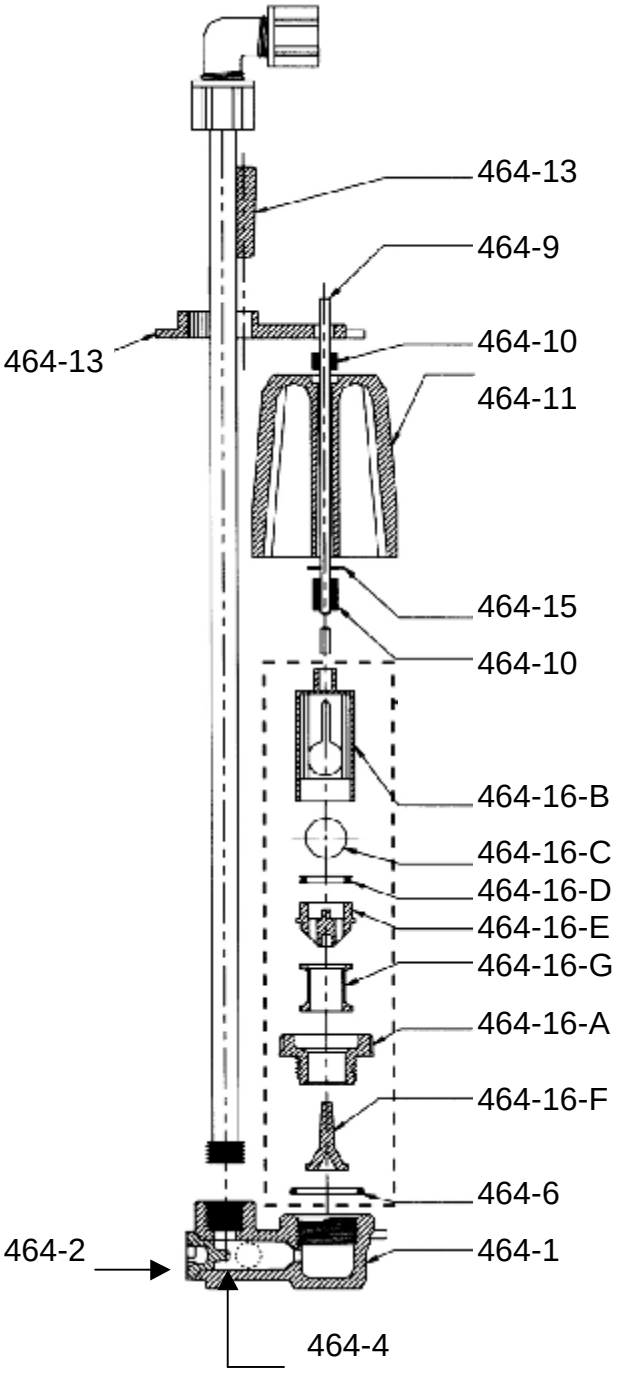
In this case the number of pins to press IN will be two.

Note: The unit uses 500 grams of permanganate every regeneration.

The filter will regenerate on any numbered day having the regeneration pin pressed inward and will skip days having the pins pulled fully outward. Normal factory setting of the regeneration time is 2:30am. Plug must be in outlet having a constant 240 volt AC power supply. The filter will regenerate automatically according to the preset schedule. If an extra regeneration is desired because of heavy water usage between regular regenerations, press **RED** knob to start automatic cycle. A period of 14 minutes will elapse before the cycle actually begins. This will not change the normal schedule.

5. Press the **RED** knob to initiate regeneration. When regeneration is complete the unit will be ready for service.

POTASSIUM TANK FLOAT VALVE



ADJUSTMENT OF VALVE

1. Lift float rod to full up position.

2. Set float to distance shown. Measure from top of crown nut to the bottom of the float.

MODEL	FLOAT DISTANCE (X)
AFIM20	180mm

NOTE: Float height should be such the water is approximately 15-20mm above shelf in regenerating tank.

PARTS LIST

Part No.	Description
464 - 1	Body
464 - 2	Plug
464 - 3	"O" Ring
464 - 4	Check Ball
464 - 6	Quad Ring
464 - 9	Float Rod
464 - 10	Float Grommet (2 Req)
464 - 11	Float
464 - 12	Float Rod Guide
464 - 13	Float Rod Guide Lock
464 - 15	Washer
464 - 16 - A	Crown Nut
464 - 16 - B	Ball Cage
464 - 16 - C	Air Check Ball
464 - 16 - D	Quad Cup Seat
464 - 16 - E	Ball Cage Bottom
464 - 16 - F	Stem
464 - 16 - G	Spool Seat

COMMISSIONING

A period of (4) hours soaking should elapse after filling with water and potassium permanganate before commissioning, so as to precondition the media.

Step 1: Check plug is dry first, then connect lead into power outlet, switch on.

Step 2: Remove clear cover from timer face by pulling the two black lock pins outward. Depress the red knob *(Fig. 14)* and rotate anti-clockwise to backwash position, release red knob, wait for valve drive to index to backwash position, (if not already in this position) spindle fully out. *(Fig.11).*

Step 3: Just open inlet isolating valve approximately 1.1/2 turns. Allow unit to fill slowly (water will issue to drain) continue to run until the unit automatically indexes to Pause position which may take up to 20 minutes. All air must be removed.

Step 4: Depress the red knob and turn anti-clockwise until the microswitch trips into the fast rinse position. Allow the valve to move fully into this position *ie. Fig. 13*. The filter should then purge any remaining potassium permanganate to waste. Further rotate the red knob anti-clockwise so that the arrow tip is pointing at about a seven o'clock position. Then allow the red knob to advance electrically around to the Service position. This may take up to 10 minutes.

Step 5: Depress the red knob and turn anti-clockwise to start, release, the unit will now go through each cycle - Backwash, purge and back to service automatically.

NOTE: A small amount of media may pass to drain during the initial backwash, this is considered normal.

Step 6: Check with site supervisor that unit can go on line. If so - slowly open outlet isolating valve fully, check that manual bypass valve is fully closed. This unit is now on line.

Step 7: Check for and report any leaks.

Step 8: Set the backwash frequency to Tuesday, Thursday and Saturday, if frequency of backwash has not already been calculated. To set, PUSH the skipper pins IN on the skipper wheel on days Backwashing is required.

Note: This is only a guide for initial setting and should be altered to suit each individual installation in accordance with load conditions. If more than one backwash per day is required the 440 Timer Knob will have to be replaced with a special unit. Please consult the factory.

Step 9: Set time of day, pull timer knob (Fig. 14) and set arrow to the time of day (time of your watch) release, make sure that the knob has re-engaged gear, knob right in. Backwash will take place at approximately 2 a.m. If this time is not convenient it will be necessary to offset the time of day setting to make allowances for the desired time of backwashing. Eg. If 4 a.m. is desired, it will be necessary to set the time of day two hours earlier than actual time.

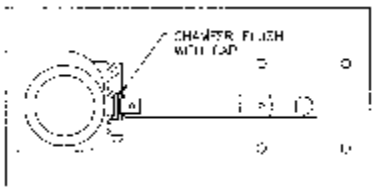
Step 10: Replace the timer cover, depress the lock pins, wipe over unit.

Step 11: Do final check for leaks etc. Ensure instruction book is kept with relevant personnel.

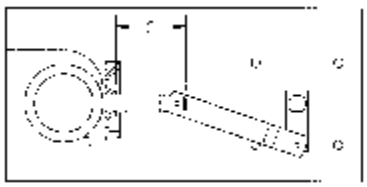
Step 12: Use Manganese Greensand only.

Step 13: Adjust the regenerate float as follows:
220 mm DRAW DOWN RATE - 11 mm/minute
Connect regenerant throttle valve at the rear of main valve and connect regenerant throttle valve approximately 1.1/2 turns. The regenerant tank will fill, add 3kg of potassium permanganate stir for 1 minute or until all crystals are dissolved, open or close regenerant throttle valve until 11 mm/minute draw down rate is attained

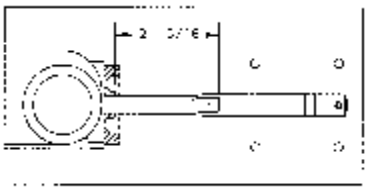
DRIVE PISTON POSITIONING



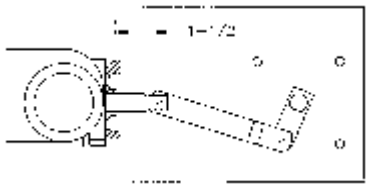
(1) SERVICE POSITION



(3) BRINE AND SLOW RINSE POSITION



(2) BACKWASH POSITION



(4) FAST RINSE POSITION

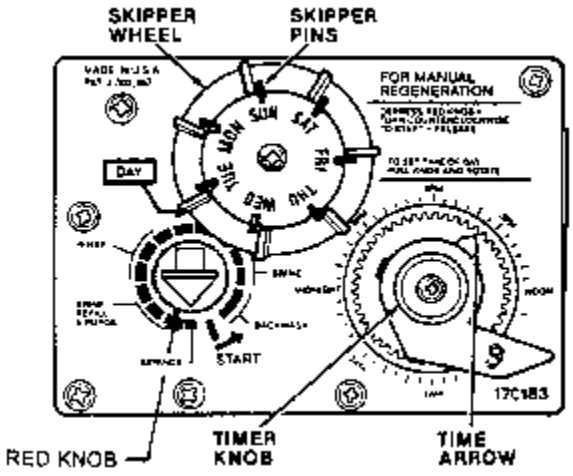


FIG. 14

SET TIMER

Determine a regeneration schedule for the conditioner and adjust the automatic timer as follows:

1. Pull all SKIPPER PINS out (away from control).
2. Rotate SKIPPER WHEEL until DAY ARROW points to day of week or number 1.
3. Depress SKIPPER PIN(S) for day(s) regeneration is required.
4. Pull TIMER KNOB out (away from timer face) and rotate until BLACK ARROW on tripper arm points to correct time of day on Face Plate.
5. Timer will automatically initiate regeneration on preset days at 2:30AM. To alter time, simply reset TIMER KNOB to an earlier or later time, which will change the time of regeneration by the same number of hours. (Time indicated as BLACK ARROW will no longer be correct).

MANUAL OPERATION

Step 1. START-UP OR INSPECTION REGENERATION

a) Push in RED KNOB and turn counterclockwise past START to BACKWASH. Disconnect electrical power and leave in position for desired time. Reconnect electrical power.
b) Push in RED KNOB and repeat for all desired cycles

Step 2. MANUAL INITIATION OF REGENERATION

a) Reconnect electrical power.

b) Push in RED KNOB and turn counterclockwise to the START position. Release. Unit will then go through a complete regeneration as programmed.

BACKWASH CYCLE TIME INSTRUCTIONS

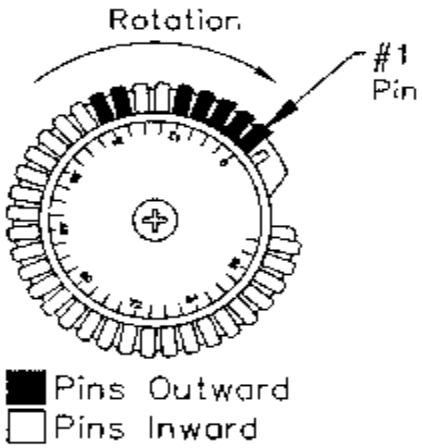
PIN TIME CHART

BACKWASH OR FAST RINSE		PAUSE	
NO. OF PINS OUT	TIME	NO. OF PINS IN	TIME
1	8min.	2	1.5 min.
2	11 min.	3	4.5 min.
3	14 min.	4	7.5 min.
4	17 min.	5	10.5 min.
5	20 min.	6	13.5 min.
6	23 min.	7	16.5 min.
7	26 min.	8	19.5 min.
8	29 min.	9	22.5 min.
9	32 min.	10	25.5 min.
10	35 min.	11	28.5 min.
11	38 min.	12	31.5 min.
12	41 min.	13	34.5 min.
13	44 min.	14	37.5 min.
14	47 min.	15	40.5 min.
15	50 min.	16	43.5 min.

 Each additional pin either pulled out or pushed in equals 3 minutes

TYPICAL FILTER APPLICATION CYCLE

Backwash …….. 20 min. - 5 pins outward
Pause …… 1.5 min. - 2 pins inward
Fast Rinse …….. 11 min. - 2 pins outward



SET BACKWASH TIMING

Pull pins as shown for backwash time desired - see chart.

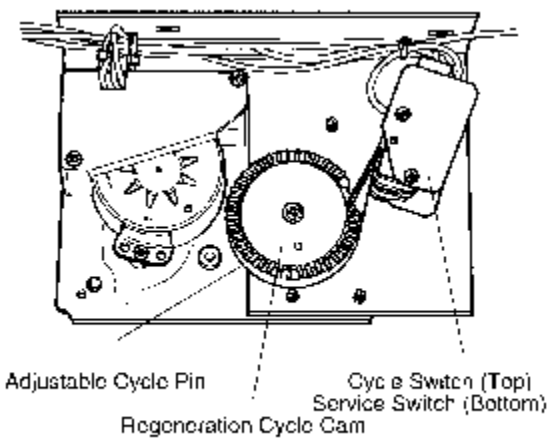
SET PAUSE TIMING

Depress pins as shown for desired brine/rinse time - see chart. (Minimum of two pins down)

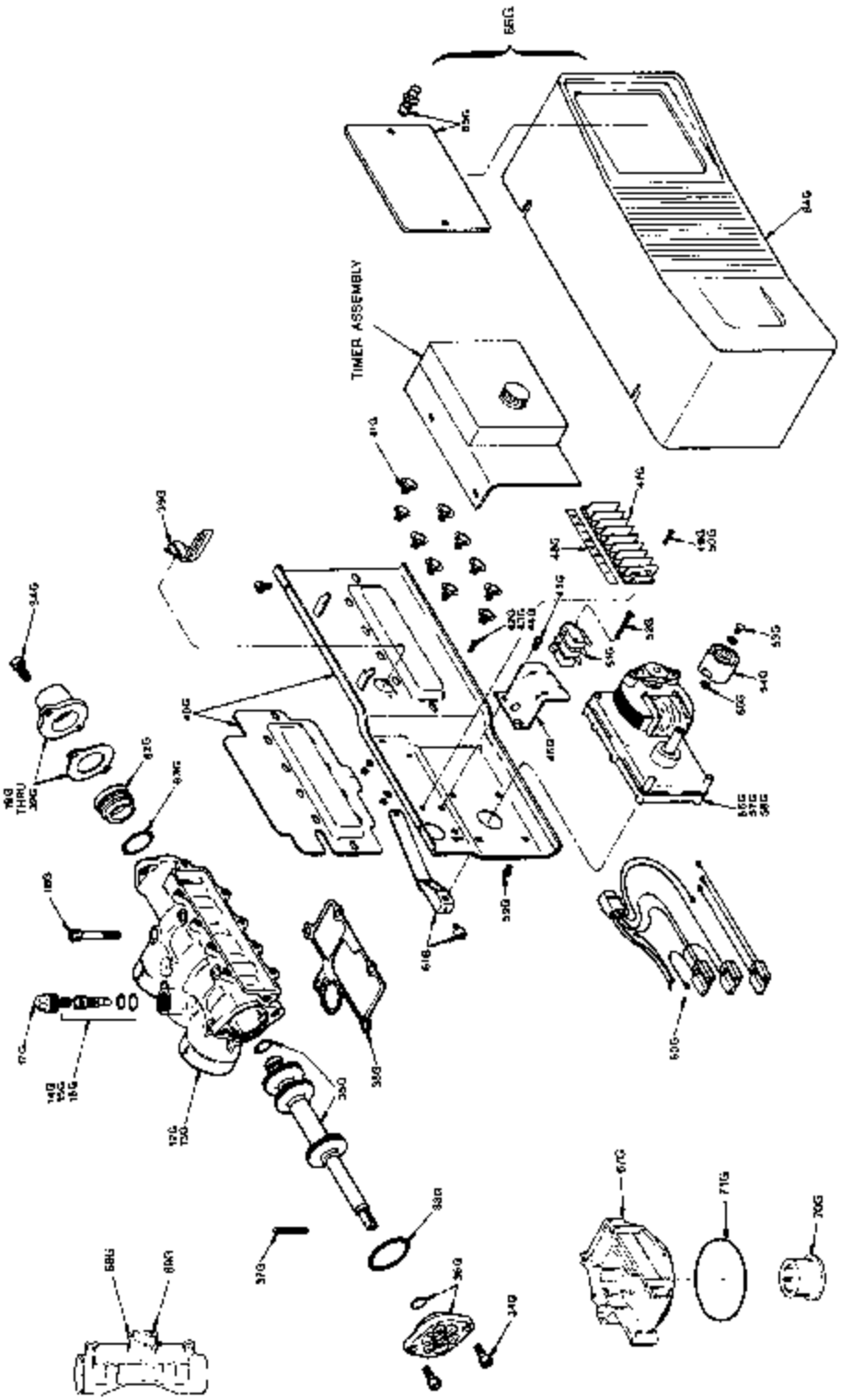
SET FAST RINSE TIMING

Pull pins as shown for desired fast rinse time - see chart

TIMER (REAR VIEW)



REPLACEMENT PARTS



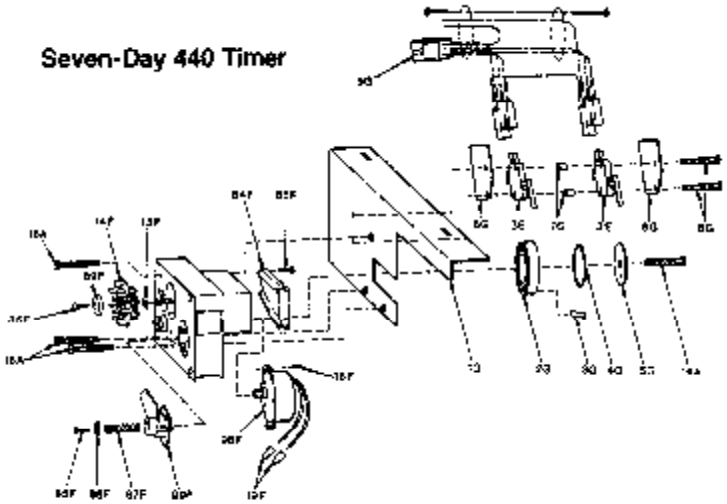
Valve Assembly

VALVE ASSEMBLY PARTS LIST

Item	Description	No. Required	Item	Description	No. Required
12G	Valve Body NPT	1	49G	Screw	2
13G	Valve Body BSPP	1	50G	Nut	2
14G	Injector Assy. small	1	51G	Limit Switch	3
15G	Injector Assy. Med	1	52G	Machine Screw	2
16G	Injector Assy. Large	1	53G	Cam Screw	1
17G	1/2" Brass Pipe Plug	1	54G	Cam	1
18G	Cap Screw	5	55G	Lock Washer	2
32G	Backwash Assy. BSPP	1	56G	Drive Motor, 100v-120v, 50Hz/60Hz	1
33G	O Ring	1			
34G	Cap Screw	4	57G	Drive Motor, 240v 50Hz	1
35G	Piston Assy.	1	58G	Drive Motor, 240v 50Hz/60Hz	1
36G	Lower Cap Assy.	1	59G	Motor Screws	4
37G	Cotter Pin	1	60G	Wiring Harness	1
38G	Manifold Gasket	1	61G	Drive Link Assy.	1
39G	Timer Lock	1	62G	Drain Shut-off Valve	1
40G	Motor Plate Assy.	1	63G	O Ring	1
41G	Hex Head Screw	10	64G	Cover	1
42G	Ground Screw	1	65G	Window Cover w/- Fasteners	1
43G	Lock Washer	1	66G	Cover Window Cover w/- Fasteners	1
44G	Nut	1	67G	Top Mount Adaptor - O Ring	1
45G	Screw	2	68G	Side Mount Adaptor (NPT)	1
46G	Switch Bracket	1	69G	Side Mount Adaptor (BSPP)	1
47G	Terminal Strip	1	70G	Distributor Seal	1
48G	Marker Strip	1	71G	O Ring	1

SEVEN DAY 440 TIMER LIST OF PARTS

Item	Description	No. Required	Item	Description	No. Required
14A	Cam Screw	1	89F	Day Dial Washer	1
16A	Timer Mounting Screw	3	99F4	7 Day Tripper Assy.	1
3E	Limit Switch	2	1G	Timer Bracket	1
14F7	Skipper Wheel - 7 Day	1	2G	Adjustable Cam	1
15F	Friction Washer	1	3G	Timing Pin	36
18F	Motor Mounting Screw	2	4G	O Ring	1
19F	Wire Nut	2	5G	Retaining Washer	1
84F	Cover Plate	1	6G	Switch Insulator	2
85F	Screw	4	7G	Switch Spacer	2
87F	Compression Spring	1	8G	Switch Mounting Screw	2
88F	Gear Retainer	1	9G	Wiring Harness	1



WIRING DIAGRAM - 440
SIX-DAY OR SEVEN-DAY TIMER

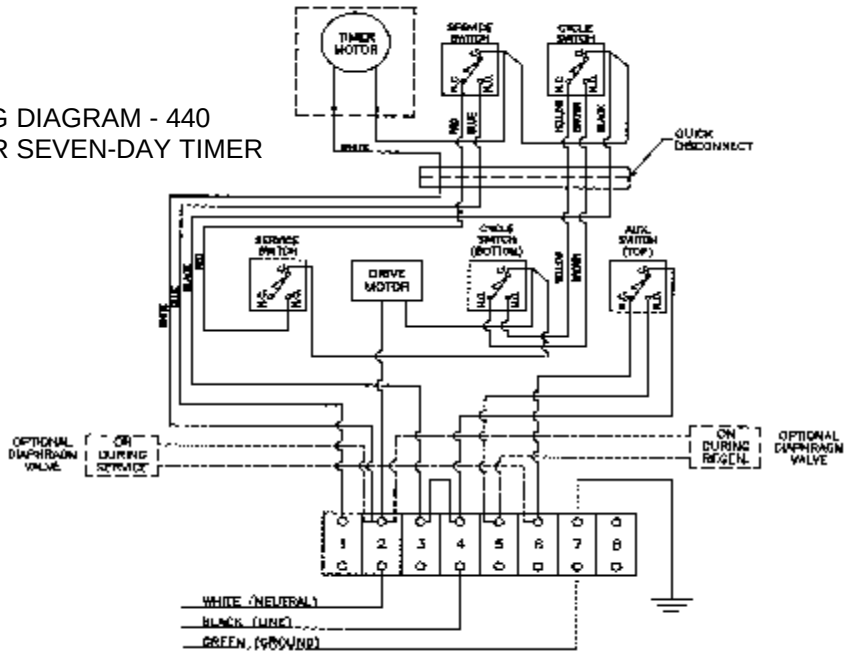


FIG. 17

MODEL 180 VALVE CAM POSITION
GENERAL MAINTENANCE

For correct operation the cam should be set to stop, the position at the point of each function. This is done at the factory and rotation checked at this time. However, resetting may be necessary from time to time should the unit fail to draw brine. Setting is simple, index position to service position, (fully in), switch off power, loosen screw "A", adjust cam to position shown above. Switch on power.

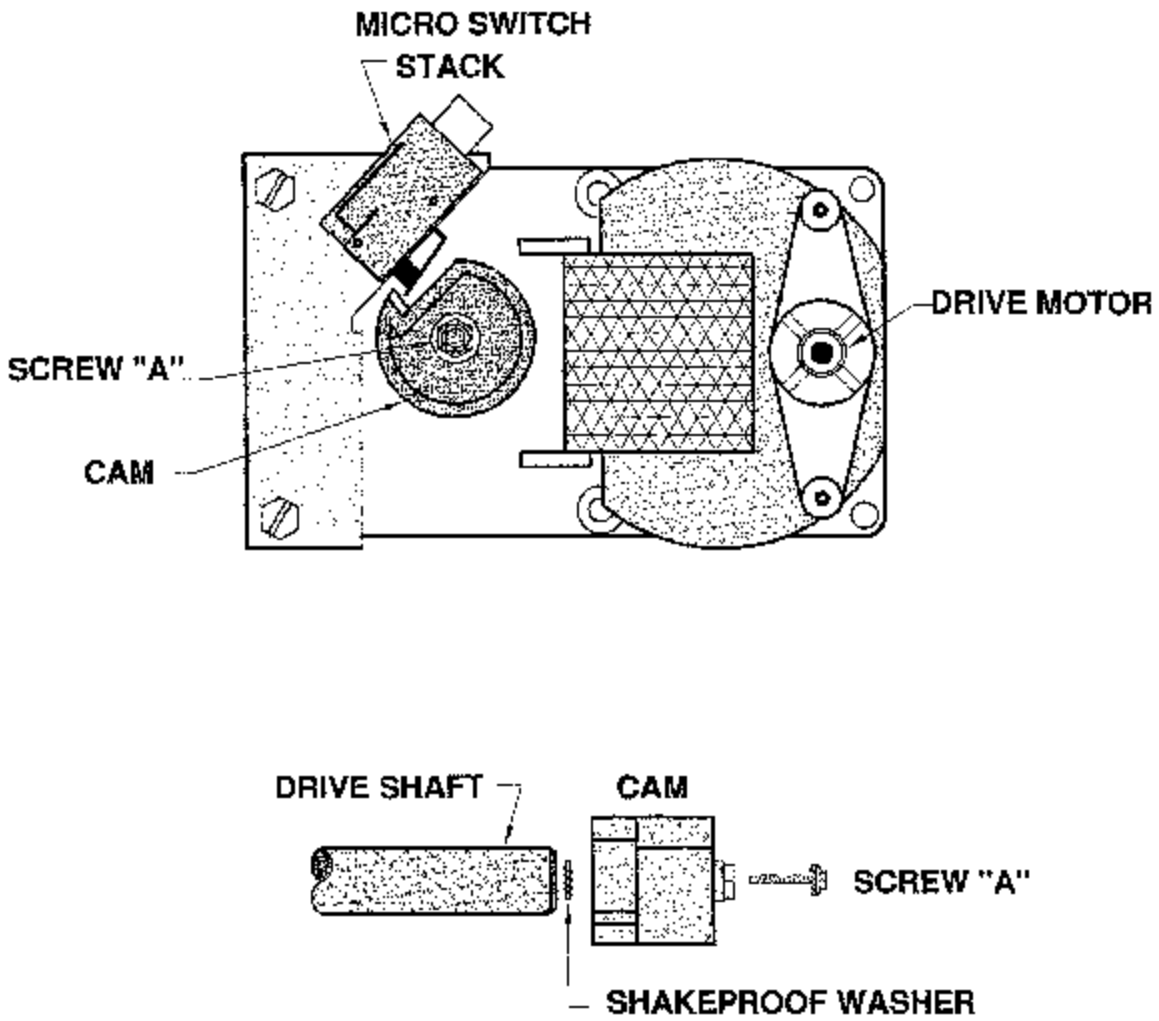


FIG. 19

TROUBLE SHOOTING

GUIDE

AFIM20-180

Iron & Manganese Removal Filter

PROBLEM	REF. PAGE
UNIT WILL NOT BACKWASH AUTOMATICALLY	Page Twenty
UNFILTERED WATER TO SERVICE	Page Twenty
LEAK TO DRAIN	Page Twenty One
INSUFFICIENT SERVICE FLOW RATE	Page Twenty One
MINERAL TO SERVICE	Page Twenty Two

1. Unit will not Backwash Automatically

A) **IS THERE POWER TO THE UNIT ?**
B) **IS THE POWER CORD PLUGGED IN ?**
C) **IS THERE A REMOTE SWITCH IN THE LINE ISOLATED ?**
- check these possibilities, and correct if necessary

D) **IS THE TIMER MOTOR RUNNING**
- if the timer motor is running, the small driven gear on the timer motor will be turning. If not, replace the timer motor.

E) **BACKWASH DRIVE GEAR NOT ENGAGED**
- check gear behind push button on timer for proper alignment, and time of day lever is down and fully engaged.

F) **VALVE MOTOR MICRO SWITCH NOT OPENING OR CLOSING**
- adjust micro switch stack (Fig. 19)

G) **VALVE MOTOR MICRO SWITCH BURNED OUT**
- replace micro switch

H) **VALVE MOTOR MICRO SWITCH NOT OPENING OR CLOSING**
- replace micro switch

I) **TIMER MOTOR SWITCH BURNED OUT**
- replace micro switch

2. Unfiltered Water to Service

A) **RUBBER SLEEVE MISALIGNED OR MISSING AT TOP OF DISTRIBUTOR PIPE**
- remove valve head and replace rubber sleeve

B) **UNIT INSTALLED BACKWARD**
- check arrow markings on top of valve head for correct inlet/outlet plumbing

C) **REFER SECTION 1 FOR FURTHER INFORMATION**

D) **BYPASS VALVE NOT CLOSED**
- check operation

E) **INSUFFICIENT DOSING OF POTASSIUM PERMANGANATE**

□ check sample prior to filter □ pink?

F) **INSUFFICIENT BACKWASH FREQUENCY**
□ increase backwash frequency

3. Leak to Drain

A) **CHECK PLUNGER POSITIONING**
□ refer Fig. 12

B) **CHECK DRAIN SHUT-OFF 'O' RING**
□ located in upper cap (refer Part No. 35G)

4. Insufficient Service Flow Rate

A) **VALVE NO OPENING**
(Units equipped with optional service isolation valve)
□ the valve must open fully when in service
□ dirt, rust, scale, etc. May prevent the valve from opening
□ disassemble and clean

B) **UNIT MAY BE FOULED WITH SUSPENDED SOLIDS**
□ backwash and check again

C) **SERVICE INLET OR OUTLET VALVE NOT FULLY OPENED**
□ ensure they are opened

D) **PISTON OUT OF POSITION**
□ reposition (refer Fig.10)

E) **INSUFFICIENT WATER PRESSURE**
□ check

5. Mineral to Service

A) **RUBBER SLEEVE MISALIGNED OR MISSING AT TOP OF DISTRIBUTOR PIPE**

- remove valve head and replace rubber sleeve

B) **UNIT INSTALLED BACKWARD**

- check arrow markings on top of valve head for correct inlet/outlet plumbing

C) **BACKWASH FLOW RATE EXCESSIVE**

- check flow control

D) **RISER PIPE OR BOTTOM STRAINER BROKEN**

- remove media and replace riser tube assembly